

Serial No. 10/035,356

REMARKS

Status of Application:

This amendment is responsive to the Official Action dated January 21, 2003.

Claims 1 - 29 were pending in the application.

Claims 28 and 29 were allowed.

Claims 10-12, 19 and 22 were objected to as being dependent on a rejected claim.

Claims 1-9, 13-18, 20, 21, and 23-27 were rejected on the basis of prior art.

Acknowledgement of Allowable subject matter:

The Examiner has indicated that there is allowable subject matter present with regard to the obliquely angled surface of the encapsulant.

Current Changes:

By way of this amendment, the Applicant has amended claim 18 to include the subject matter of claim 19, with claim 19 now being canceled, and amended claim 22 to include the subject matter of claim 18.

Further, by way of this amendment, the Applicant has added new method claims 30 - 32.

Accordingly, claims 1-18 and 20-32 are currently pending.

Claim Rejections under 35 USC §102:

Claims 1-4, 9, 13, 16-18, 20, 21, and 23-25 were rejected under 35 USC §102(e) as being anticipated by Kuczynski (6,356,686).

Claims 1 - 17 and 30-32 are method claims.

Claims 18 - 29 are apparatus claims.

Applicant acknowledged the allowability of claim 19. With respect to the rejection of claims 18, 20, 21, and 23-25 under 102(e), Applicant has amended claim 18 to include the subject matter of claim 19. Claims 20-21 and 23-27 were directly dependent from claim 18. Accordingly, the amendment of claim 18 should place claims 18, 20-21, and 23-27 in

Serial No. 10/035,356

condition for allowance. Withdrawal of the rejection with respect to claims 18, 20 - 21, and 23-25 is respectfully solicited.

With respect to method claims 1-4, 9, 13, and 16-17 Applicant respectfully solicits reconsideration.

The Patent to Kuczynski discloses an encapsulated optoelectronic subassembly including a substrate, a device die, an encapsulant and an optical transmission medium. However, the method in which the parts are assembled and the final assembly differ from the claimed subject matter.

The present invention seeks to provide an encapsulated optoelectronic device which can interface with a removable optical transmission medium. The encapsulation shaping is accomplished with a mold that is removed, and results in an encapsulated device that can stand on its own. The optical transmission medium is thereafter removably secured to the substrate in a later step. Due to the dual alignment of the device die with the substrate and subsequently, the alignment of the molded encapsulant relative to the device die, the optical transmission medium can be reliably aligned after encapsulation. Kuczynski focuses on alignment and permanent fixation of the optical transmission medium prior to encapsulation. The transmission medium is not thereafter removable.

Referring to Figs. 3 and 4 of Kuczynski as referenced by the Examiner, the device die 230 is fixed to the substrate 210 with adhesives. The die contains alignment holes 240. The optical coupler 300 includes alignment pins 310. The optical coupler 300 is "roughly" aligned with the die 230 by inserting the alignment pins 310 into the alignment holes 240. Fine alignment is then carried out through a procedure and then the coupler 300 is permanently fixed in place with adhesive. The resulting gap between the device die and the fixed optical coupler is then filled with an encapsulant.

"Alignment holes 240 receive coupler pins 310 to roughly align optical fibers 190 in optical coupler 300 with VCSELs 235. Alignment of optical fibers 190 with VCSELs 235 is critical to ensure that light signals are properly transmitted to an optical fiber cable (not shown). Thus, alignment holes 240 are oversized to allow precise alignment by orienting coupler pins 310 to a proper position within alignment holes 240. Alignment is accomplished

Serial No. 10/035,356

by means of precision stages driven by an appropriate alignment algorithm, as known to those skilled in the art. Once alignment is verified and complete, optical coupler 300 is secured to carrier 210 with a suitable adhesive." Column 5, line 62 through Column 6, line 5.

"To prevent interfering accumulations of matter from forming in the gap, an optically transparent substrate encapsulant 400 is preferably dispensed into the gap between die 230, or another substrate, and optical coupler 300, as shown in FIG. 4." Column 5, lines 19-23.

It is thus clear that in Kuczynski, the optical coupler is aligned with the die by an alignment procedure and then permanently fixed in position relative to the die. The encapsulant is then filled into the resulting gap.

In contrast, the present invention provides a substrate with mechanical guides fixed on the substrate. The device die is positioned onto the substrate using a placement tool which rides on the mechanical guides and aligns the die relative to the guides. The placement tool is thus effective for consistently aligning the die relative to the mechanical guides. Thereafter, the encapsulant is dispensed onto the die, and the encapsulant is formed into a predefined shape using a mold which rides on the mechanical guides. The shape of the encapsulant is defined by the mold and is also thereby aligned relative to the mechanical guides. By using the mechanical guides to align both the die and the encapsulant relative to a common reference, a repeatable and reliable positioning system can be achieved. In this regard, the optical transmission medium has a connector ferrule with connector shaped to the molded encapsulant. Accordingly, when the optical transmission medium is mounted onto the mechanical guides, the connectorized fibers in the medium align properly with the discrete elements on the die.

Turning to the claims as rejected, claims 1 and 17 both recite the steps of providing the die, dispensing the fluid encapsulant over the die, shaping the encapsulant, and curing the shaped encapsulant. Shaping of the encapsulant is accomplished with the mold, which is pressed down on the liquid encapsulant and then removed. The optical transmission coupler is attached to the substrate after shaping and curing.

Serial No. 10/035,356

Kuczynski discloses a method of providing the die, aligning the optical coupler, securing the optical coupler with adhesive, and filling the gap between the die and the coupler with an encapsulant. There is no active step of shaping. Furthermore, there is no mold.

Because Kuczynski lacks any disclosure or teaching of actively shaping the encapsulant with a mold, claims 1 and 17 cannot be anticipated by or rendered obvious in view of Kuczynski.

New claims 30-32 are also believed to define patentable steps over Kuczynski.

Reconsideration and allowance is respectfully solicited.

Claim Rejections under 35 USC §103:

Claims 5-8, 14, 15, 26, and 27 were rejected under 35 USC §103(a) as being unpatentable over Kuczynski '686.

Claims 26-27 are now believed to be allowable as dependent claims from amended claim 18. Withdrawal of the rejection with respect to claims 26 and 27 is respectfully solicited.

With respect to claims 5-8, 14 and 15, the Examiner noted Kuczynski's lack of disclosure of providing mechanical guides on the substrate. Kuczynski discloses the alignment pins on the optical coupler. In light of the explanation above with regard to use of the mechanical guides to first position the die, and then to shape the encapsulant over the die using a mold, it is submitted that switching the alignment pins from the coupler to the substrate is not simply a matter of design substitution. The claimed method would not be possible without the mechanical guides fixed in position on the substrate. The guides provide a common fixed point of reference for alignment of both the die and the encapsulant through the use of the placement tool and mold which use the guides for alignment.

The alignment pins in Kuczynski are not effective for the same purpose, and are admittedly only used for "rough" alignment of the coupler to the substrate. Fine alignment is accomplished using an algorithm and other techniques. By referencing the die and then the encapsulant to the fixed guides on the substrate, the individual optoelectronic devices are reliably positioned within the shaped encapsulant and can provide a consistent platform for mating of the transmission medium having a like shaped connector end.

Serial No. 10/035,356

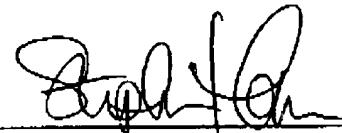
Reconsideration and allowance of claims 5-8, 14 and 15 is respectfully solicited.

Claims 1-18 and 20-32 are therefore believed to be in condition for allowance and the application ready for issue.

Corresponding action is respectfully solicited.

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Respectfully submitted,



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